Fort Cronkhite, Antiaircraft Battery No. 1
Wolf Ridge
Sausalito vicinity
Marin County
California

HAER No. CA-134-1

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Western Regional Office
National Park Service
U.S. Department of the Interior
San Francisco, California 94107

HISTORIC AMERICAN ENGINEERING RECORD

Fort Cronkhite, Antiaircraft Battery No. 1

HAER No. CA-134-1

Location:	Wolf Ridge, Fort Cronkhite Sausalito vicinity, Marin County, California UTM: 10.540320.4188394 Quad: Point Bonita
Date of Construction:	1940-1942
Engineer:	U.S. Army Corps of Engineers
Builder:	U.S. Army
Present Owner:	Golden Gate National Recreation Area National Park Service U.S. Department of the Interior
Present Use:	Vacant; used occasionally for interpretation
Significance:	Antiaircraft Battery No. 1 is the finest surviving example of an antiaircraft artillery emplacement of the World War II era in the system of seacoast defenses that protected the San Francisco Bay area. It is considered to be the prime potential exhibit for interpreting the subject of antiaircraft defense in the national recreation area, and is of special note due to the surviving evidence of the intensive effort to camouflage it because of its exposed location.
Report prepared by:	Stephen A. Haller Park Historian Golden Gate National Recreation Area Fort Mason, Building 201 San Francisco, CA 94123
Date:	May 1993

Antiaircraft Battery No. 1 was constructed on Wolf Ridge in Fort Cronkhite, Marin County, California, commanding the skies over Battery Townsley, and overlooking Rodeo Lagoon to the south and Tennessee Valley to the north. The Height Finder, Director Pit and Ready Area, subjects of this narrative, were built approximately 1,000 feet to the northeast of the antiaircraft battery's guns, on a knob of the ridge at an elevation of 847 feet. The terrain is open and consists of coastal grassland and low chaparral over a substrate of rocky soil and broken rock.

At present, the site consists of six major structures (height finder, director pit, quonset hutment, hutment anteroom, battery offices and day room/mess hall), three minor outlying features (a concrete footing pad and two open pits) and a series of collapsed connecting tunnels, all within a radius of some 90 feet of the top of the knob [see page 7 for "site plan-surface features" and page 10 for "subsurface (interior) details"; also see HAER photographs no. CA-134-1-1 and CA-134-1-2].

The **height finder** is a reinforced concrete square, 11 feet per side with inside walls 3' 2" high. Once partially sunk into the ground, it now sits exposed atop the knob. On its northwest corner, a three-foot-square entranceway was cut away to allow access by way of a tunnel from the rest of the complex. The structure once provided a level and protected platform for an optical height finder, which transmitted firing data to the guns to the battery below. It is evident from the lack of any mounting devices on the height finder floor that the instrument was not permanently mounted to the structure. The height finder appears to have had a camouflaged roof, at one time, since wood, chicken wire and concrete debris are located about 15 feet to the east. A number of wood planks that are laid at an angle across the north corner of the structure do not appear to be historic features of the structure, but, rather, some sort of temporary shelter placed there by a later visitor [see HAER photographs no. CA-134-1-A-1 and CA-134-1-A-2].

The **director pit** is also a reinforced concrete square, with outside dimensions of approximately 11 feet per side. The inside walls are 5' 6" high, which evidently provided more protection for the equipment and operators that at the height finder. In the east corner, four steel ladder rungs are attached to the inside walls. On the southwest wall is a small recess for an electric receptacle and junction box for the ordnance cable connection, from which a cable still leads underground to the other junction box at the gun battery below. The director pit is presently sunk some four feet into the ground, and has a 3-foot square opening cut into its southwest wall to provide access to a tunnel. There is no evidence of any permanent mounting devices for the mechanical gun director computer. A movable gable roof is located immediately to the northeast of the director pit. The roof is made of corrugated metal over metal angle frames and is covered by remnants of camouflage material: wood boards, chicken wire and concrete-formed false rock. On each of its four corners are rollers with flange wheels. The roof hid the director pit from view, yet could be quickly slide open on metal rails imbedded into the tops of the northwest and southeast walls [see HAER photographs CA-134-1-B-1 and CA-134-1-B-2].

On the south side of the complex is a structure evidently used as **battery offices**. It is constructed in a cut-and-fill fashion, so that its contours blends into the hillside and lies largely below the surface. It is approximately 32' in length and 9' wide, and is adjoined throughout its length by a 2' 3" wide tunnel which provides the only access to the structure. The office is a rough-finished, wood-framed structure

with three rooms and a wood-framed, tar-paper and corrugated tin roof lightly covered with earth for concealment. There is approximately 7' 10" overhead clearance. This structure is in generally poor condition and the roof has partially collapsed in three areas. The room to the southwest, 9' x 12', has two (now empty) windows on the outside wall located over a recessed cupboard from which small wires (evidently for telephones) lead underground. A fuse box and breaker panel are located in this area. The interior walls are painted a dusky yellow and there is linoleum on the floor. An interior door leads into the center room, which has no other access. It is approximately 9 feet wide and 12' long, with whitewashed walls, one of which has an red-painted octagonal patch on it. There is a doorway between the first room described and the center room, and a window frame is cut into the wall between the center room and the northeast room. The northeast room can only be entered by a door off the tunnel and has whitewashed walls [see HAER photographs no. CA-134-1-1, CA-134-1-C-1 and CA-134-1-C-2].

On the north side of the complex lies the buried **quonset hut** (or "hutment", as the Army called it) and the **anteroom** which provides access to it. The anteroom is a rough-framed structure, lightly covered with earth, with the interior wood frames and roof rafters exposed. A short tunnel at the far end, now partially filled with earth, leads to a 35' long, 9' 5" wide, semi-circular corrugated steel quonset hut. This hut was placed on concrete footings located in a cut made in the side of the hill and then buried underground. Just above the quonset hut, but still underground was laid a shallow-gabled layer of 2' thick concrete which acted as a "burster course" to set off aerial bombs before they penetrated to the hutment. The interior of the hut is lined with 4x4 wooden uprights, which photographic evidence confirms once supported bunks. In the middle of the "ceiling," there is a circular vent of corrugated steel culvert section formed into a dogleg pattern. Inside are faintly visible words "Ft. Cronkhite." The far end of the hutment is now boarded up, but once led, by way of a tunnel, to the final "major" structure on the site, the day room/mess hall [see HAER photographs no. CA-134-1-D-1, CA-134-1-D-2, CA-134-1-E-1, and CA-134-1-E-2].

The **day room/mess hall** is 13' wide and 60' long. It is rough framed with 4x4 timbers and 2x8 planks on the outside with 2x6 planks over 2x8 roof rafters. The roof is covered with a thin layer of dirt with considerable broken wood debris on top, and has six small square wooden-lined vent holes. There are no interior walls, and the interior framing appears to have once been whitewashed. This structure was constructed in similar fashion to the office; that is, the side of the hill was cut away, the structure was built below grade so that it rises only a couple of feet above its surrounds, and then the site was backfilled. This structure is in very poor condition, since the earth backfill has caused the walls to be pushed inward from the bottom, so that a cross section is now in the shape of the letter 'v'. Nevertheless, the interior is accessible, and contains a number of details indicative of the life of the soldiers who occupied it. There is a rifle rack painted olive drab and also what is evidently a pool cue rack on the southeast wall. The remains of a porcelain sink, a water heater, electric conduit and light fixture boxes indicate what accommodations were made for the soldiers' comfort [see HAER photograph no. CA-134-1-F-1].

All the "major" structures at the site were connected by tunnels, now collapsed, formed by plank walls and roofs that were covered by earth when the area was backfilled [see HAER photograph no. CA-134-1-A-2].

The "minor" structures on the site consist of a 2' x 3' concrete pad with ruined wooden planks alongside, which once may have had a generator on it, and two 5' diameter open pits located approximately 30' west of the western end of the day room/ready room. Each pit has a concrete-filled vertical pipe at its center, which were evidently used to mount machine guns for close-in protection of the site [see HAER photograph no. CA-134-1-G-1].

At the time, camouflage techniques generally relied upon overhead netting, which was probably used to break up the outlines of the buildings and tunnel entrances, while applique stone surfacing and artificial rockwork supplemented concealment efforts as the war progressed. This site contains outstanding examples of these techniques in the rockwork surrounding the "generator" pad and the applique surfacing on the roof of the director pit.

As early as 1916, before the country's entry into World War I, plans had been made for three two-gun batteries of antiaircraft guns to be permanently emplaced to protect the harbor defenses of San Francisco Bay. By 1925, such batteries had been constructed at Fort Funston, Fort Miley and Fort Winfield Scott, south of the Golden Gate, and at Fort Barry to the north.[1]

As the nation began to plan for rearmament in the fact of the threats to peace, the "1937 Project for the Harbor Defenses of San Francisco" was prepared, which envisioned 5 three-gun batteries (adding Fort Cronkhite to the list). These batteries consisted of permanent mounting pads for 3" Antiaircraft Gun Model M1917 A1M2 on Fixed Mount M1917M2. The particular battery at Fort Cronkhite was located on a commanding height called Wolf Ridge, and designated Antiaircraft Battery No. 1. It also consisted of a combined storeroom/powerplant structure and a magazine, both dug in near the guns and made of heavy reinforced concrete construction. Some 1000' uphill on the crest of a knob 847 feet above sea level was a height finder and director pit which supplied firing data to the guns below by means of a cable connection. The equipment at this battery was standard coast artillery equipment of the time and typical of antiaircraft artillery weapons and emplacements used throughout the continental United States during World War II.[2]

As was usual U.S. Army practice at the time, construction of permanent seacoast fortifications was designed and carried out by the Corps of Engineers through the U.S. Engineer Office, San Francisco, California. The permanent construction was commenced on July 3, 1939, completed on April 26, 1940, and transferred to the Coast Artillery Corps on July 24, 1940, as documented in a series of photographs taken on that date, including the three guns and their mounts and the storeroom and power plant.[3] Also see pages 9, 10, and 11 of this document. These structures are additionally documented in a map dated November 20, 1940, and a "Report of Completed Works--Battery Plan" dated July 24, 1940 [see pages 12 and 13]. The remainder of the structures were built later, probably shortly after the nation's entry into World War II. Photographic documentation shows that the hutment, at least, was certainly completed by March 12, 1942 [see page 14].

The particular mission of Antiaircraft Battery No. 1 was to fire at any enemy aircraft within range and thus protect the two huge 16-inch casemated rifles at nearby Battery Townsley which covered the sealanes approaching the Golden Gate from the north. In the tense and uncertain atmosphere that existed for months following the Japanese air raid on Pearl Harbor, this mission was no longer theoretical, and carrying it out was perceived to pose a constant threat for the men who manned the guns.

The thought might seem remote to us today, but it is necessary to see the situation through the mind of those who lived through it in order to understand history. It indeed was theoretically possible for the Japanese to have launched a massive air raid on the West Coast's most strategic port, and the fact that they chose to follow up on their successful surprise attack by sending their striking force eastward to the Indies and the Bay of Bengal was not known to the men who sat in the wind, sunshine, rain and fog and waited. It was at this point the requirement for round-the-clock watches caused the Army to construct further "temporary" facilities at the director/height finder site (i.e., the hutment and anteroom, offices, day room/mess hall and perhaps the generator pad). It is not known if these "temporary" facilities were built by the Corps of Engineers or by the Coast Artillery or other units actually manning the site at the time, although similar "concealed hutments" were built elsewhere in the Harbor Defenses of San Francisco "by Government plant and hired labor."[4]

Before December 7, 1941, elements of the 6th Coast Artillery Regiment (Harbor Defense) manned the defenses of Fort Cronkhite.[5] From June 6, 1942 to June 25, 1944, Antiaircraft Battery No. 1 was manned by Battery B, 130th Coast Artillery Battalion (Antiaircraft).[6] By 1945, four 40mm automatic cannon and four .50 caliber machine guns supplemented the battery's defensive fire. It is known that the 3" guns and their associated fire control equipment remained in place until after November 1945, although they had been rendered completely obsolete by more powerful weapons used on overseas battlefronts during the war.[7]

Prior to November 1945, a radar set, SCR-584, replaced the optical height finder and mechanical gun director computer. This was a portable unit that was not permanently emplaced, but set up in a van that was located just west of near Battery Townsley.[8] About 500 feet further up the ridge, another radar set, SCR-682, was mounted by July 25, 1944. However, this radar was considered a "general Surveillance detector" (one of only two such units in the Harbor Defenses of San Francisco) and therefore only relates to Antiaircraft Battery No. 1 by its proximity, not by specific functional relationship. Its four concrete mounting pylons and concrete mounting pad remain to this day.[9] See also page 15 of this document.

In July 1952, four 120mm Antiaircraft Guns Model M1A1, supplemented by .50 caliber "Quad-fifty" machine guns, took over the antiaircraft defense mission at the site. Firing data for the big guns was supplied by an M33 Radar in a van that sat atop the ammunition/generator bunkers. They were manned by Battery C, 9th Antiaircraft Artillery Gun Battalion, remained in place until approximately 1956, when the Nike missile system became operational.[10] See also page 16 of this document.

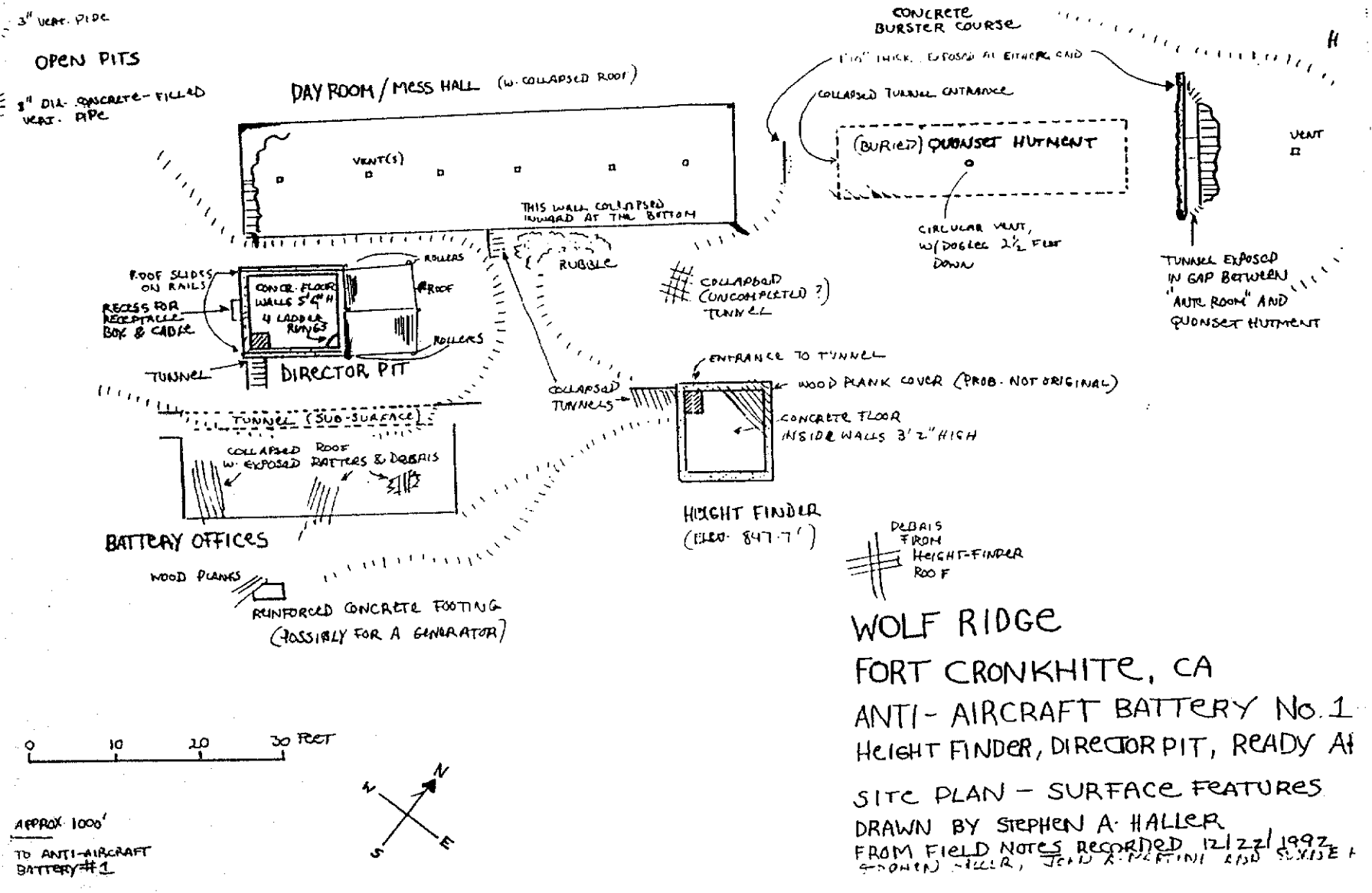
The site is now within the Baker and Barry forts and the Cronkhite Historic District and is listed in the National Register of Historic Places. Antiaircraft Battery No. 1, including the height finder, director pit and ready area, is assigned structure number FC-1200, and is specifically listed as a contributing element in the "surviving elements of coastal fortifications in the Marin Headlands [which] have been said to 'constitute one of the two or three finest museums of military architecture to be found on the American continent and certainly the most extensive.'"[11]

National Park Service Historic Resource Study, written in 1979, recommends that, as by far the best preserved permanent antiaircraft site in GOGA, it be "preserved and stabilized and made safe for visitors. It is recommended that this battery be considered the prime exhibit for interpreting the history of

antiaircraft defenses of San Francisco." In subsequent years, park rangers have led special interpretive tours of the site.[12]

In 1985, a study was begun to evaluate and identify structures eligible for inclusion in a national historic landmark to document the Seacoast Fortifications of San Francisco Bay. This study was begun again in 1992 with the addition of a historian to park staff. The Antiaircraft Battery No. 1 at Wolf Ridge was examined as a part of the preliminary field work for this study.

Unfortunately, since the Historic Resource Study was written, landslides have permanently closed the only road that provides access to the site. This remote area can now only be reached by foot or four wheel drive vehicle. At present, the National Park Service intends to stabilize the site against further deterioration by removal of excessive dirt overlay to weak areas and shoring up of partially collapsed roofing, minor replacement of rotten timbers and removal of safety hazards such as wooden debris and protruding nails. All work will be done in strict compliance with historic preservation laws and existing programmatic agreements.



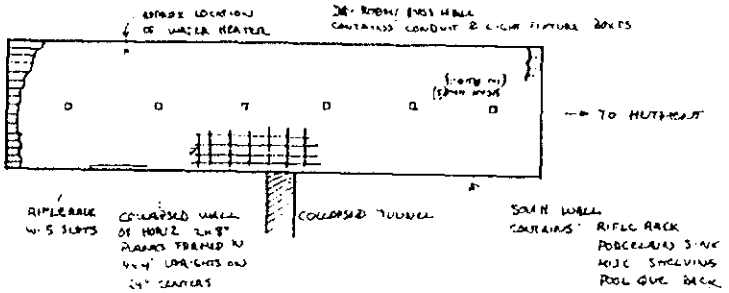
WOLF RIDGE
FORT CRONKHITE, CA
ANTI-AIRCRAFT BATTERY No. 1
HEIGHT FINDER, DIRECTOR PIT, READY AI

SITE PLAN – SURFACE FEATURES

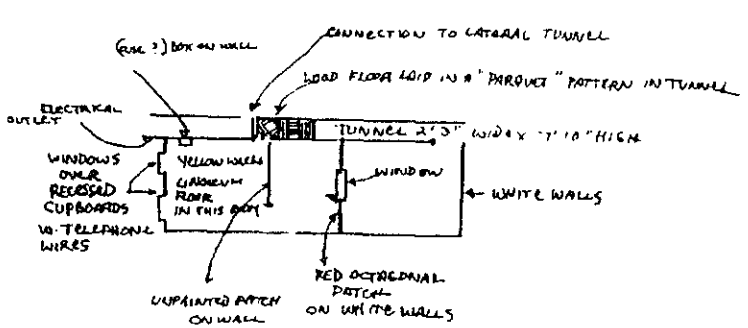
DRAWN BY STEPHEN A. HALLER

FROM FIELD NOTES RECORDED 12/22/1992 [illegible]

DAY ROOM / MESS HALL -- UNDERGROUND LEVEL
PLAN VIEW



BATTERY OFFICES -- UNDERGROUND LEVEL
PLAN VIEW



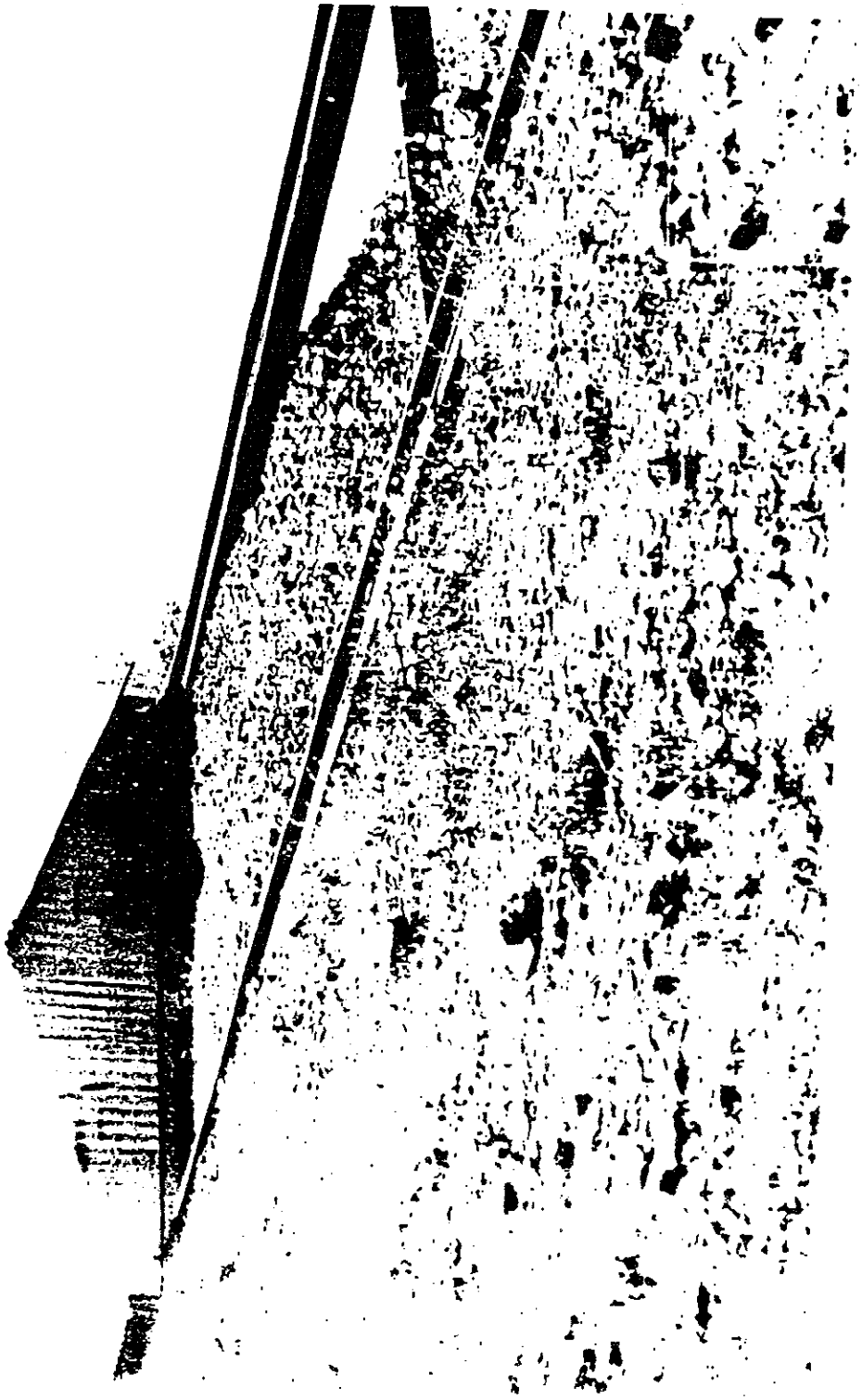
NOTE ON ROOFING CONSTRUCTION:
CONSISTS OF WOODEN TIMBERS AND
WOODEN RAFTERS COVERED WITH
CORRUGATED METAL (WAR) SHEETING
SET IN CONCRETE LAYER.

0 10 20 30 FEET

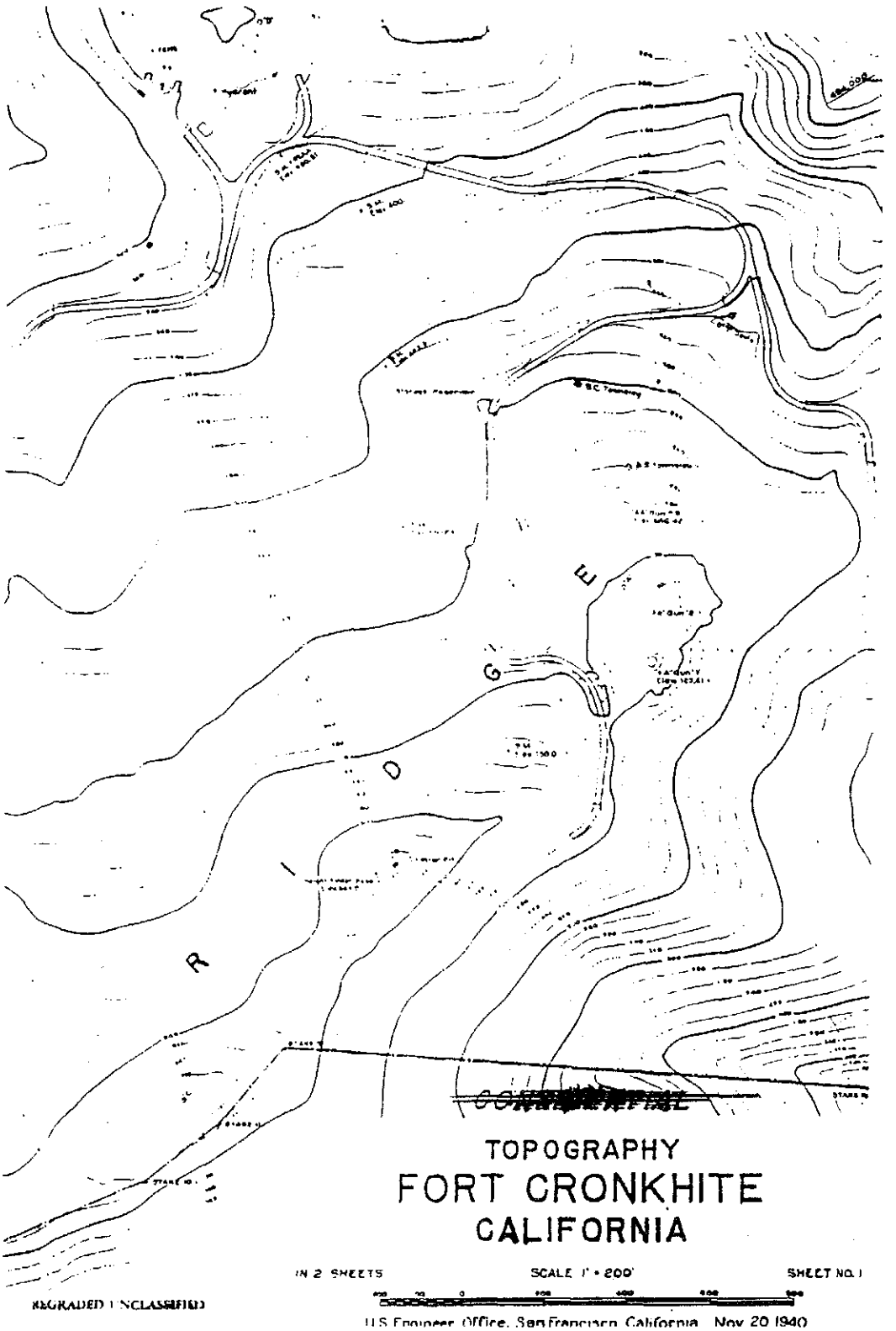
WOLF RIDGE
FORT CRONKHITE, CA
ANTI-AIRCRAFT BATTERY No. 1
HEIGHT FINDER, DIRECTOR PIT, READY AREA
SUBSURFACE (INTERIOR) DETAILS
DRAWN BY STEPHEN A. HALLER
FROM FIELD NOTES RECORDED 12/22/1992 BY
STEPHEN A. HALLER, CHRIS A. MARTINEZ AND

Guns, Storeroom and Power Plant
July 24, 1940
Collection of Golden Gate
National Recreation Area

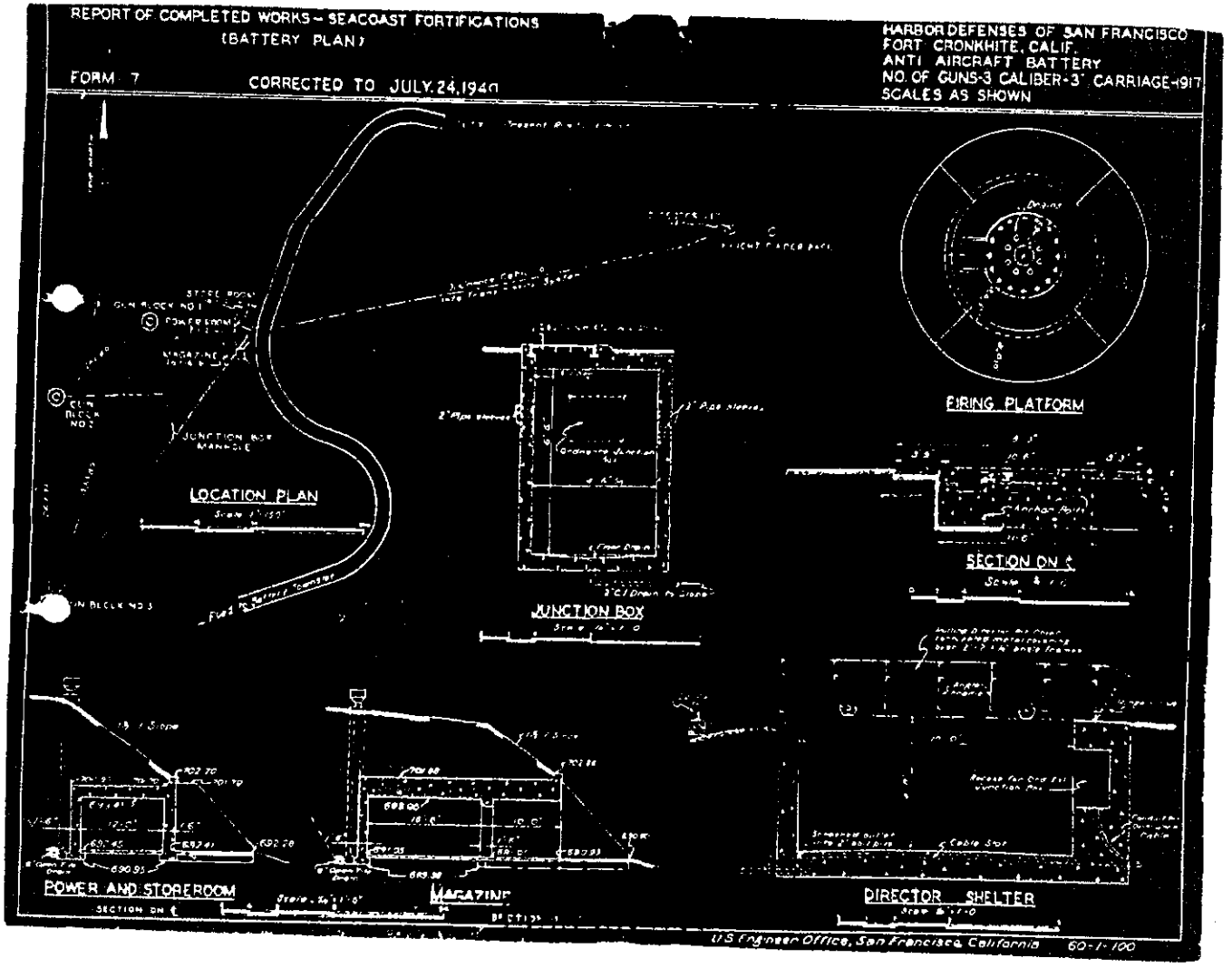
3-inch Antiaircraft Gun
July 24, 1940
Collection of Golden Gate National Recreation Area



Director Pit Roof
July 24, 1940
Collection of Golden Gate
National Recreation Area



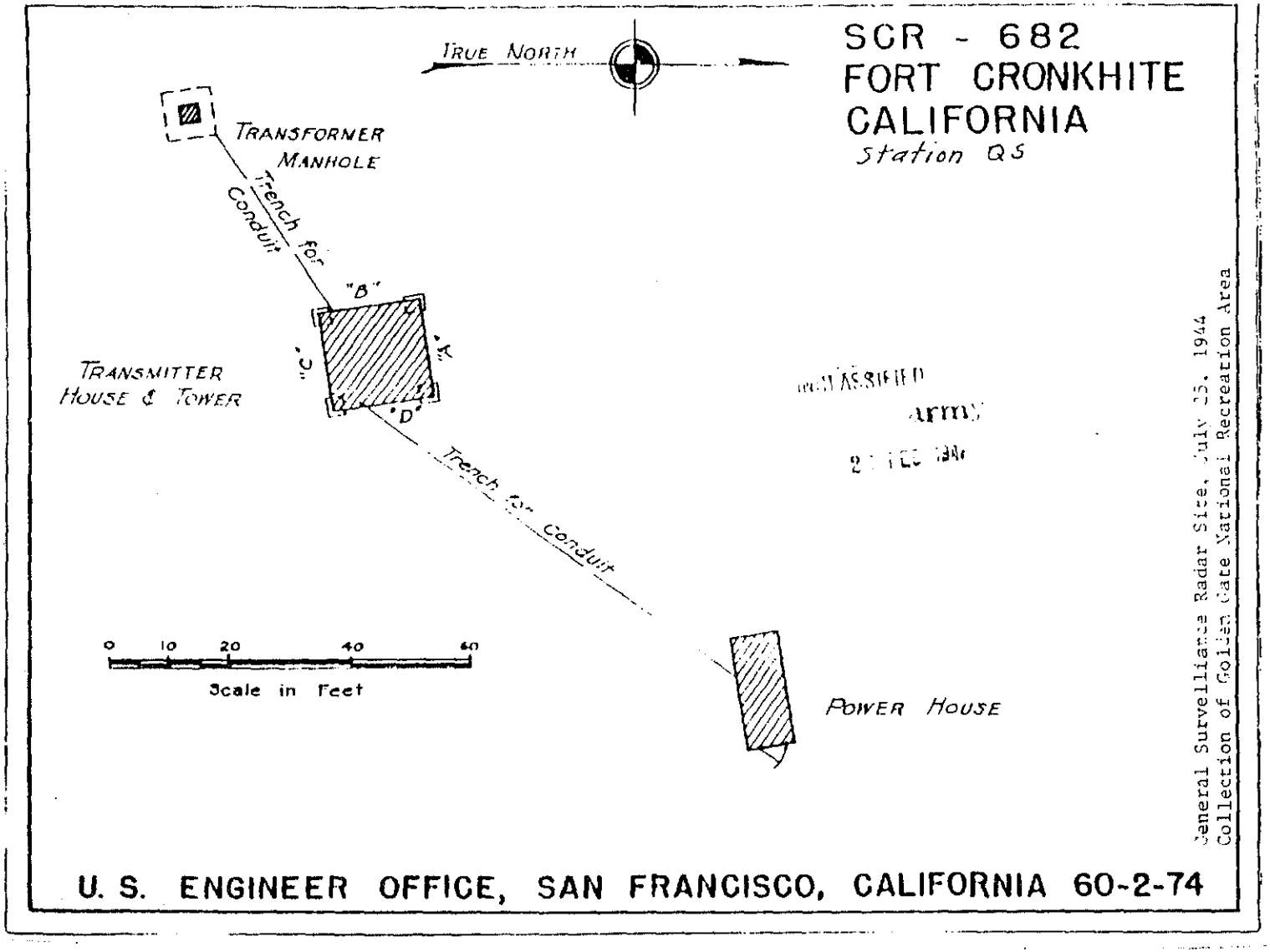
Collection of Golden Gate National Recreation Area



Collection of the Directorate of Engineering and Housing, Presidio of San Francisco, CA

No. 342-B
2ABO
Wolf Ridge
Interior Quarters
San Francisco District
March 12, 1942

Interior of Buried Quonset Hutment
March 12, 1942
Collection of Golden Gate
National Recreation Area


SCR - 682
FORT CRONKHITE
CALIFORNIA
Station QS
TRUE NORTH
TRANSFORMER MANHOLE
Trench for Conduit
"B"
"C"
"A"
"D"
TRANSMITTER HOUSE & TOWER
Trench for conduit
POWER HOUSE
0 10 20 40 60
Scale in Feet
U. S. ENGINEER OFFICE, SAN FRANCISCO, CALIFORNIA 60-2-74
General Surveillance Radar Site, July 25, 1944
Collection of Golden Gate National Recreation Area

120mm Antiaircraft Guns at Antiaircraft Battery No. 1

ca. 1952-1956
Collection of Golden Gate National Recreation Area

END NOTES

1. Seacoast Fortifications of San Francisco Harbor, Golden Gate National Recreation Area, California, by Erwin N. Thompson, Denver Service Center, National Park Service, Denver, CO., 1979, p. 281.

2. "Annexes to Harbor Defense Project, Harbor Defenses of San Francisco, 1937," National Archives, RG 407, Records of the Adjutant General's Office.

3. "Hallway Voucher Files, Fiscal Year 1942," Directorate of Engineering and Housing, Presidio of San Francisco, CA.

4. Ibid.

5. "Harbor Defenses of San Francisco, Christmas 1941," (Cresci Collection, Golden Gate National Recreation Area Archives.

6. Thompson, op. cit., page 384.

7. "Supplement to the Harbor Defense Project, Harbor Defenses of San Francisco, 1937," National Archives, RG 407, Records of the Adjutant General's Office.

8. "Information Booklet: Seacoast and Antiaircraft Defenses Found on Wolf Ridge," by Milton B. Halsey, Jr.; published monograph in Golden Gate National Recreation Area Archives, ca. 1986.

9. "Hallway Files," Drawer R-2, Military Reservations," Directorate of Engineering and Housing, Presidio of San Francisco, CA.

10. Personal interview with Mr. Stan Ward of Woodland, CA (who was a member of Battery C, 9th Antiaircraft Artillery Gun Battalion in 1952-1953); February 16, 1993.

11. National Register of Historic Places, Inventory--Nomination Form for Rancho Sausalito; Lime Point Military Reservation; Forts Baker, Barry and Cronkhite; Marin Headlands," dated January 11, 1979.

12. Thompson, op. cit., page 472.